

Examiner asserts that the present invention is unpatentable over Wen, in view of Tenhover. Applicants respectfully disagree. They believe that examiner has been misled by a misappreciation of the role of the "liquid" in the present application and in Wen. The liquid(s) referred to therein are used in completely different ways, to different purposes, and in physically different locations within the respective CVD apparatuses of disclosed by Applicants and Wen.

Applicants wish to summarize the key advantages offered by their apparatus and point out explicitly the role of their liquid in achieving these advantages.

First, the present invention insures constant uniform mixing of the carrier gas with the vapor emanating from the powdered precursor material. It does so by : 1) incorporating said precursor in an ultra-low vapor pressure liquid in which it is insoluble; 2) placing the resulting slurry/suspension/emulsion in the interior of the bubble of the apparatus, the interior being defined as that volume in which the carrier gas can flow; 3) flowing the carrier gas exactly as one would do with a liquid precursor.

When these steps are carried out the splashing and agitation of the slurry incorporating the precursor serves to facilitate uniform mixing of the carrier gas and the precursor vapor.

Second, the present invention uniquely and unprecedentedly prevents the finely divided solid particles from recrystallizing into larger crystallites, which would lower the delivery rate of precursor vapor. It achieves this goal, as explained at length in the specification, by virtue of the insolubility of the precursor in the liquid in which it is suspended, and the concomitant separation thus effected between the solid and vapor phases of the precursor.

By contrast, the Wen reference discloses a system in which solid precursor alone, absent suspending liquid phase, is present in the interior of his "bubbler". (see material 11 in Fig. 3 of Wen, and col. 4, lines 32-33 ). Wen attempts to solve the problem of non-constant precursor mixing by adopting a novel shape for the walls enclosing the interior of his "bubbler" and relying on a combination of gravity and gas flow pattern. Thus the term "bubbler" is clearly a misnomer in Wen's device, as there is no liquid phase in which the carrier gas can form bubbles, in contrast with Applicants' invention as claimed where mixing is achieved by the agitation of the suspending liquid caused by the actual bubbling of the carrier gas through the liquid. The only liquid referred to at all by Wen in his entire disclosure is the liquid comprising his heat bath.

Heat baths are a common technique for thermostating chemical processes and no doubt antedate the emergence of the science of chemistry from the mediaeval practice of alchemy. Neither Wen, nor Applicants would claim any novelty or uniqueness for the use of such a venerable method. Note that the heat bath in Wen (See Fig. 3, element 13) is clearly physically separated from precursor 11, by the various walls defining the interior of the bubbler (Fig 3, items 21-24) . Clearly no carrier gas (Fig. 3, element 14) can be present in region 13.

In summary, Wen uses a liquid, of unspecified properties, as a heating agent. His invention clearly offers no efficacy whatsoever with regard to the problem of substrate recrystallization, which is an object of the present invention and which the present invention solves.

The present invention, by way of contrast, uses a carefully specified liquid in which solid precursor is contained in an insoluble suspension for the purpose of promoting mixing and for the amelioration of the recrystallization problem, not as a method to supply heat to the precursor. Thus it is a mere coincidence that liquids are employed, albeit to different ends and with different effects, in the two inventions.

Examiner takes official notice that oils of high heat capacity, such as silicone oil may be employed in heating baths. This point is entirely moot, as the present invention contains no heating bath. However, for completeness. It is noted that ultralow vapor pressure is not generally a requirement for the liquids used in heating baths, and thus the fact that a given oil might be profitably employed in a heating bath is no basis for asserting that it would be a suitable suspending agent for the purposes of the present invention. The former is based upon physical properties whereas the latter is controlled by the chemical properties.

For instance, at moderate temperatures, *water* is a common liquid used in heating baths, but its vapor pressure is many orders of magnitude too high to be employed in the present invention. By analogy, Wen's liquid and Applicants' have about as much to do with one another as gasoline and hydraulic brake fluid. Both of the latter may be found in some, but not all, automobiles, but are deployed in different locales and used to different purposes and have different characteristics bearing directly on their essential respective functionalities. Applicants submit that Wen is a minor variation on the prior art of solid-gas only delivery systems and does not anticipate Applicants' invention in any way.

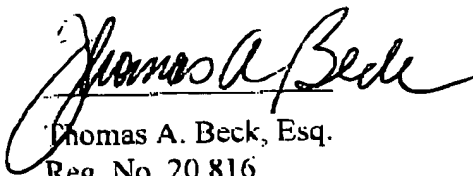
The reference to Tenhover adds precisely nothing to Wen. Tenhover is merely an assembly of specific instances of performing CVD reactions. It is not concerned with the design of vapor delivery systems employing solid source precursors.

Applicants have invented an improved delivery system. It may be applied to any number of CVD processes, or to other purposes not anticipated. The instant invention facilitates a wide variety of such processes by improving the delivery system.

Applicants' attorney has attempted to revise the claims so that they clearly distinguish over the references cited. If the Examiner believes that there are other modifications to be made to the claims which would result in their allowability, Applicants' attorney would be willing to discuss the matter with the Examiner by telephone at a mutually convenient time.

In view of the arguments presented and amendment to the claims, allowance of the claims is respectfully solicited.

Respectfully Submitted,



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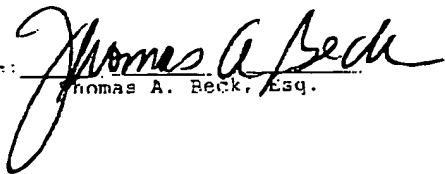
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